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ABSTRACT

Research linking teaching behavior to student learning is reviewed in this study. Precis of findings of research over a period of 25 years are presented with an analysis of trends of both research methodology and teaching methods. (JD)

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Advances in Teacher Effectiveness Research

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This paper was presented as part of a research symposium entitled "Progress Report: Advances During the Past Year in the Knowledge Base for the Preparation of Teachers," at the annual meeting of the American Association of Colleges for Teacher Education, Chicago, Illinois, March 1, 1979. Portions of the paper were presented earlier as part of the Keynote speech to the annual meeting of the Midwest Association of Teachers of Educational Psychology, Bloomington, Indiana, November 3, 1978.

Historically, reviewing research linking teaching behavior to student learning has been a frustrating task. Morsh and Wilder (1954) and Medley and Mitzel (1963) could find virtually no clear results to discuss. The situation improved somewhat in the next 10 years, so that Rosenshine and Furst (1973) and Dunkin and Biddle (1974) could point to weak but consistent findings supporting such variables as an organized, businesslike approach to teaching, clarity, and enthusiasm. Still, even where clear trends were obvious, there always seemed to be exceptions and apparent contradictions. Dunkin and Biddle resolved many of these by taking into account context variables such as grade level and subject matter, but a great many remained.

In the last five or six years, the situation has improved considerably. The National Institute of Education (N.I.E.) began funding expensive studies, and important research design improvements began to appear, such as rational rather than random or convenience sampling of teachers, inclusion of enough teachers to allow for meaningful statistical analyses, collection of many hours of data per classroom, development of multifaceted and sophisticated classroom coding instruments that take into account context and sequence of interaction rather than just behavioral frequencies, and concentration on the individual teacher and class as the unit of analysis. These studies have concentrated on instruction in basic skills in primary grade classrooms, using standardized achievement tests as learning measures.

This effort began with several large scale field correlational studies conducted at various elementary grade levels (Stallings and Kaskowitz, 1974; Soar and Soar, 1972; McDonald and Elias, 1976; Tikunoff, Berliner, and Rist, 1975; Brophy and Evertson, 1974, 1976; Good and Grouws, 1975).

These studies varied in the types of teachers and students included and the kinds of variables addressed and methods used, but there was sufficient overlap and replication to provide dependable knowledge about relationships between types of teaching, particularly direct instruction, and student learning of basic skills in the elementary grades (see reviews by Rosenshine, 1976; Medley, 1977; and Borich, 1977). Since then, other studies have built on these results, and the work has been extended to the junior high and high school levels and by experimental studies designed to test hypotheses developed from earlier correlational work.

The data from the correlational studies hang together quite well to support what Rosenshine (1977) calls "direct instruction" as effective for producing student learning of basic skills. Critical aspects of direct instruction, as described by Rosenshine (in press) include: 1) teachers focus on academic goals; 2) promote extensive content coverage and high levels of student involvement; 3) select instructional goals and materials and actively monitor student progress; 4) structure learning activities and include immediate, academically oriented feedback; 5) create an environment that is task oriented but relaxed.

Taken together, these studies provide strong support for the following generalizations: 1) Teachers make a difference. Contrary to the theorizing of Stephens (1967) and the implications of projects like the Coleman report (Coleman, et. al., 1966) that unfortunately analyzed data only at the school level, research that analyzes at the teacher level makes it clear that certain teachers elicit much more student learning than others, and that their success is tied to consistent differences in teaching behavior (see the studies referenced on page 1, and also Good, Biddle, and Brophy, 1975, and Rakow,

Airasian, and Madaus, 1978). 2) Even so, there is no support for the notion of generic teaching skills, if these are defined as the types of very specific behaviors typically included in performance based teacher education programs. Few, if any, specific teaching behaviors are appropriate in all contexts. On the other hand, when data are integrated at a higher level of generality, several clusters or patterns are consistently related to learning gains.

3) One of these includes teacher expectations and role definitions. Teachers who believe that instructing students in the curriculum is basic to their role, who fully expect to conduct such instruction, and who set about to do so in their classrooms, are more successful than teachers who do not. More effective teachers allocate more of their time for teaching, and spend more of that time accordingly.

4) Another basic cluster includes such variables as classroom management skills, student engagement/time on task, and student opportunity to learn material. Effective teachers know how to organize and maintain a classroom learning environment that maximizes the time spent engaged in productive activities and minimizes the time lost during transitions, periods of confusion, or disruptions that require disciplinary action.

5) Another cluster indicates support for the various elements of direct instruction. First, studies of general approaches to instruction consistently reveal that students taught with a structured curriculum do better than those taught with individualized or discovery learning approaches, and those that receive much instruction directly from the teacher do better than those expected to learn on their own or from one another. Teacher talk in the form of lectures and demonstrations is important, as are the time-honored methods of recitation, drill, and practice. It appears that most forms of open education or individualized instruction involve unrealistic expectations about

the degree to which students in the early grades can manage their activities and learn independently (see the studies referenced on page 1, and also Gage, 1978; Inman, 1977; and Stallings and Hentzell, 1978).

The instruction that seems most efficient involves the teacher working with the whole class (or with small groups in the early grades), presenting information in lectures/demonstrations and then following up with recitations or practice exercises in which the students get opportunities to make responses and get corrective feedback. The teacher maintains an academic focus, keeping the students involved in a lesson or engaged in seatwork, monitoring their performance, and providing individualized feedback. The pace is rapid in the sense that the class moves efficiently through the curriculum as a whole (and through the successive objectives of any given lesson), but progress from one objective to the next involves very small, easy steps. Success rates in answering teacher questions during lessons are high (about 75%), and success rates on assignments designed to be done independently are very high (approaching 100%) See the studies referenced on page 1, and also the reviews by Borich (1977), Medley (1977), and Rosenshine (1977, and 1979, in press).

6) These specifics vary somewhat with context, particularly grade level and student ability level. In the primary grades, where the emphasis is on mastering the basic skills, the teaching/learning situation differs from later grades, where students are expected to use basic skills to learn other things, and to manage their own learning to a greater degree. The early grades appropriately involve more small group instruction relative to whole class instruction, more teacher circulation around the room and initiation of contact with the students who are working on assignments (compared to letting the students come to the teacher for help), more recitation and drill (but

less genuine discussion), more praise and affect generally, very low error rates, and a low cognitive level due to the emphasis on repetition, recitation, and drill (higher cognitive level activities seem counterproductive in the early grades, although they become more important later). More specifics about grade level differences can be found in Evertson, Anderson, and Brophy (1978), McDonald and Elias (1976), Fisher, et. al. (1978), Trismen, Waller, and Wilder (1977), and Muruane and Phillips (1978).

Within any given grade level, teachers working with low ability students need to move at a slower pace and provide more repetition and individualized monitoring, to make sure that overlearning is attained before moving on to objectives that assume prior mastery of present objectives, and to supply greater warmth, encouragement, and personalized teaching generally, but less challenge (although not less than the students can handle), and less demandingness/criticism (Brophy and Evertson, 1974, 1976; Program on Teaching Effectiveness, 1978).

Current Progress

Current activities in the field feature two major trends: 1.) integration of existing correlational findings and probing the limits of their generalization to contexts beyond basic skills instruction in the elementary grades; 2.) experimental studies in which clusters of correlational findings are brought together into treatment packages and assessed for degree of implementation by teachers and for success in producing more learning than what is observed in control groups.

The maturation of the field can be seen in recent reviews, which read less like laundry lists of random findings and more like integrated discus-

sions of organized approaches to instruction. Good (in press) is publishing an interesting paper that makes many of the same points made here as well as some others I think are worth mentioning. First, he notes that the support for group based rather than individualized instruction, and for whole class instruction rather than small group instruction (except in the early grades), should renew our appreciation for the advantages of these methods. Group based instruction is often maligned by those who favor individualized and self paced instruction, but, like recitation, it survives. Good suggests, and I concur, that it survives because it has important advantages. It is easier to plan and manage, provides more modeling of correct thinking and responses for slower students, and avoids the elitism and labeling problems that can crop up when ability grouping is used. This does not mean that large group instruction should be the exclusive method, of course; it only indicates that it has advantages, is effective, and may be the method of choice for many goals and contexts.

Good also notes that traditional or direct instruction seems clearly superior to open education for producing mastery of basic skills. However, he notes, it may not be the best approach, or even appropriate, for curricular areas that do not involve skill mastery but instead seek to promote appreciation, general familiarity, enrichment, or student personal development. Nor is open education necessarily effective here, either. In this connection, Good notes that open educat on advocates have put too much stress on things like free choice of tasks or free movement around the room, which are less vital to real life application, than things like developing skills for problem solving and self-evaluation. In any case, he notes that some structure is needed for most educational activities, and that relatively more is needed in the early grades, for low ability students, and for anxious or

dependent students.

Classroom Management

Recent publications by Brophy and Putman (1978) and Evertson & Anderson (1978) have elaborated knowledge about what constitutes effective classroom management and about how it interacts with effective instruction. Brophy and Putnam review studies on classroom management generally, not just those that link it with student learning. They note strong support for most of the variables stressed by Kounin (1970): withitness, overlappingness, signal continuity and momentum during lessons, and variety and challenge during seatwork. They note that recent studies have not supported Kounin's variables of group alerting and accountability, which call for the teacher to be random and unpredictable in their questioning, to call on nonvolunteers frequently, and to require students to comment on one another's responses (to make sure that they pay attention to peers as well as to the teacher). These group alerting and accountability techniques either correlate negatively or show curvilinear relationships with learning gains. Apparently, teachers who do all the other things that Kounin stresses, and therefore are successful in maximizing student attention and engagement, should not need to use group alerting and accountability behaviors very often.

These comments help reconcile Kounin's findings with the findings of Brophy and Evertson (1974, 1976) and of Anderson, Evertson, and Brophy (1979) indicating that teachers who called on students in a predictable pattern in going around the reading group had more success than teachers who were unpredictable. Apparently, any disadvantages that this technique may involve (students who can predict when their turn will come may pay less attention when it is not their turn) are outweighed by several advantages: the me-

thod insures that everyone gets roughly equal opportunities to recite and participate in the group (often, "random" questioning really means calling on the brighter and more eager students often and the slow or alienated students seldom); the greater structure that the technique provides may be helpful to anxious students; and the automatic determination of turns prevents the distractions involved when students call out answers or petition the teacher to call on them.

Evertson and Anderson (1978) have been exploring the specifics involved in organizing and managing the classroom, and the interactions between management and instruction. Last year, they observed heavily during the first three weeks of school, and periodically thereafter, in 28 third grade classrooms, gathering information on what rules and procedures the teachers introduced, and how they did so. This year, they are observing junior high school classrooms. Preliminary results from the study strongly support two major generalizations: 1.) classroom organization and management skills are intimately related to instruction skills; good instructors tend to be good managers; 2.) at least at the third grade level, good organization and management is good instruction. That is, successful classroom managers spend a great deal of time early in the year conducting semiformal lessons to familiarize students with rules and procedures. This research is yielding very rich, detailed information about procedures involved in setting up effective classrooms, and should ultimately be extremely valuable for teacher educators.

Junior High and High School Studies

Several investigators are probing the limits to generalization of the linkages between direct instruction and student learning observed in basic skill instruction in the early grades. Recent studies by Stallings

(1978) and by Evertson, Anderson, and Brophy (1978) indicate that the key to generalization may not be student age or grade level, but mastery of basic skills as the crucial context. Stallings (1978) has been studying reading instruction at the junior and senior high school level. Her findings are very much like the findings reviewed earlier for basic skills in the early grades: growth in reading skills is associated with maximizing time on task, instructing the total group most of the time, directing questions to specific students (rather than volunteers), regularly providing feedback, controlling negative behavior, encouraging positive behavior, and using guides and probing questions when students do not know the answer. Negative indicators include grading papers during the class period, socializing or allowing students to do so, allowing interruptions and intrusions into the class activities, and allowing negative behavior.

McConnell (1977) reported the following correlates of student learning in high school algebra classes: task orientation, clarity, frequent probing to improve student response, enthusiasm, and frequent teacher talk. Again, these are familiar aspects of the direct instruction approach.

Evertson, Anderson, and Brophy (1978) report the following correlates of learning Math in 7th and 8th grade classrooms: considerable class time spent in discussion, lecture, and drill, and not just individualized instruction or individual seatwork; task oriented, businesslike instruction; much teacher time spent actively instructing and interacting with students; greater praise of good contributions (although praise was not frequent in an absolute sense); good classroom management, especially withitness; asking process (thought or explanation) questions as well as product (fact or memory) questions. With two exceptions discussed below, these findings from junior high and high school replicate what was found in the early grades, and sug-

gest that direct instruction may be the most effective method at any grade level when mastery of basic skills is the goal.

Evertson, Anderson and Brophy (1978) obtained strikingly different results for 7th and 8th grade English classes, however. Significant relationships between classroom process variables and student learning in these English classes were infrequent, and there was little support for the direct instruction model. Several factors probably explain this finding, but the major one seems to be that basic skill mastery is not a primary goal of 7th and 8th grade English classes. The instructional objectives pursued in these classes are more numerous and variable than in math classes. Many, such as poetry composition, oral dramatization, or literature appreciation, are not easily or even appropriately pursued with the direct instruction approach.

One implication, then, of recent work is that the findings concerning direct instruction do generalize to higher grade levels and different kinds of students, but only to the extent that basic skill mastery is the primary goal. Not everything generalizes, of course. Evertson, Anderson and Brophy's (1978) positive findings for public praise of student contributions and for asking higher level questions in addition to factual questions are not usually observed in the early grades. Praise correlates sometimes positively, sometimes negatively, but usually not at all with learning, depending on context factors such as student ability levels, teacher vs. student initiation, and specification and elaboration of the praise itself (praise seems to be generally overrated, although it does seem important for low ability/anxious/dependent students, provided that it is genuine and deserved and the praiseworthy aspects of the performance are specified).

Level of question or cognitive demand usually shows a negative correlation (although sometimes a curvilinear relationship) with learning in the

early grades (Rosenshine & Berliner, 1978; Soar & Soar, 1978). The implication for the early grades seems to be: move in very small steps and overteach to the point of overlearning; move at a rapid pace but do not challenge students beyond their ability to respond meaningfully.

Several recent studies indicate that the situation is somewhat different in the middle and upper grades (Evertson, Anderson, & Brophy, 1978; McDonald and Elias, 1976; Anderson & Scott, 1978; Trismen, Waller, & Wilder, 1977; Murnane & Phillips, 1978). Compared to the elementary grades, the later grades tend to have: more large group and whole class activities; less frequent and less affectively toned dyadic teacher-student interactions; less recitation and drill and more discussion; more cognitive challenge and high level cognitive activity; less teacher centeredness and more student autonomy; more sustained concentration on academic activities; and a more rapid pace within these activities.

In the early grades, it is important for the teacher to elicit responses from and provide feedback to each individual student (this is a major reason why small group instruction is important at these grade levels). Later, this individualized (within the group context) instruction is no longer necessary, and it becomes more important for the teacher to keep the whole class together and move along at a good pace. Basic skills have been mastered, and learning objectives now involve higher cognitive activity, so challenging students with difficult or complex questions is more appropriate. Still, though, learning should be relatively easy - most questions should be answered and students should be able to complete independent work assignments correctly.

Eliciting student contributions, integrating them into the discussion, and praising the more noteworthy ones all become useful techniques that cor-

relate positively with learning gains. In this connection, recent work has helped clear up the apparent discrepancies between the writings of Flanders (1970) and some of these data supporting the direct instruction model. There is continuing and increasing support for the effectiveness in the upper grades of certain aspects of what Flanders called "indirect teaching": praise, use of student ideas, and high frequencies of student talk (if it is focused on academic objectives; non-academic student talk correlates negatively with learning).

These data must be placed in context, however. It appears that the really important determinants of learning at the higher grade levels are not the things that Flanders clustered under "indirect instruction," but instead are other aspects of teaching that Rosenshine includes under "direct instruction": frequent lectures, demonstrations, and teacher led discussions (Barr and Dreeben, 1977). In the process of doing these things, teachers elicit frequent student contributions, which makes it possible for them to use student ideas and to integrate them into the discussion, as well as to praise them. In any case, eliciting them in the first place seems to be the crucial variable here, not praising them or integrating them into the discussion.

Interactions with Learner Characteristics

Another recent trend is the qualification of general process-product findings by analyzing the data for aptitude-treatment interactions (ATI's) or other interactions between learner characteristics and optimal instruction. Brophy and Evertson (1974, 1976), Good and Grouws (1975), Evertson, Anderson, and Brophy (1978), and the Program on Teacher Effectiveness (1978) group all noted somewhat different patterns of optimal instruction for

students who differed in socioeconomic status or ability level. Other investigators have analyzed interactions between instructional methods and student personality characteristics or classroom behavior patterns in determining student learning (Ebmeier and Good, in press; Peterson, 1977; Cunningham, 1975; Bennett, 1976; Solomon and Kendall, 1976). These findings have not been well integrated yet, because somewhat different student traits have been used as the basis for classification, but certain trends are already evident: direct instruction (and close teacher monitoring and supervision generally) are needed more by students who are anxious and dependent, distractible, low in ability, or low in achievement motivation. Students with opposite traits can handle more of their learning independently. I expect to see more such research in the near future, followed by attempts to integrate these interaction data with main effects data in order to make prescriptions about how teachers can optimize the tradeoffs that are necessarily involved in teaching groups of students.

Experimental Studies

The final recent trend discussed here is probably the most important: the design of experimental studies to test the causal linkages between teacher behavior and student learning that are implied but not proven by correlational studies. Obviously, such work needs to be done if we are to claim that teacher behavior correlated with student learning actually causes that learning.

Recently, three major field experiments have been conducted to follow up on the process-product work reviewed here. Anderson, Evertson, and Brophy (1979) pulled together 22 principles of small group instruction derived from earlier work and organized them into a coherent treatment designed

for first grade teachers to use with their reading groups. Good and Grouws (In press) included a variety of principles drawn form their earlier correlational work into a systematic approach for teaching mathematics in 4th grade, and tested these principles in an experimental study. Finally, Crawford, Gage, and their colleagues in the Program on Teaching Effectiveness (1978) at Stanford pulled together a large number of principles drawn from previous work by Brophy and Evertson (1974, 1976), Stallings and Kaskowitz (1974), Soar and Soar (1972), and McDonald and Elias (1976), into a treatment designed for the third grade level.

Each of these studies produced statistically significant results favoring treatment teachers over control teachers in producing student learning gains on standardized achievement tests. Each also involved a strong observation component, so the teachers could be monitored for the degree to which they implemented the treatment (and control teachers could be monitored for the degree to which they spontaneously included treatment behaviors in their teaching). These observational data yielded implementation scores for each of the teacher behaviors included in the treatment, and these scores could be analyzed to see if they showed the expected relationships with learning scores.

Not all treatment elements have been implemented properly, of course, and not all of those that were implemented have shown the expected significant relationships with learning scores. However, where the treatment behaviors were implemented sufficiently, and where significant results were obtained, the findings have been overwhelmingly positive, replicating previous correlational work and providing stronger evidence of a causal linkage between teacher behavior and student learning.

Most of these findings are quite prescriptive, although many of them allow for teacher judgment. This can be seen in the following examples drawn from the study by Anderson, Evertson, and Brophy (1979), all of which were well implemented by the treatment group teachers and were significantly related to learning gains.

1. Once in (reading) group, the children should be seated with their backs to the rest of the class while the teacher is facing the class.
2. The introduction to the lesson should contain an overview of what is to come in order to mentally prepare the students for the presentation.
3. The teacher should work with one individual at a time in having the children practice the new skill and apply the new concept, making sure that everyone is checked and receives feedback during the lesson.
4. The teacher should use a pattern (such as going from one end of the group to the other) for selecting children to take their turns reading in the group or answering questions (rather than calling on them randomly and unpredictably).
5. When call-outs occur, the teacher should remind the child that everyone gets a turn and he must wait his turn to answer.
6. After asking a question, the teacher should wait for the child to respond and also see that other children wait and do not call out answers. If the child does not respond within a reasonable time, the teacher should indicate that some response is expected by probing.
7. Praise should be used in moderation. The teacher should praise thinking and effort more than just getting the answer, and should make praise as specific and individual as possible.
8. Criticism should also be as specific as possible, and should include specification of desirable or correct alternatives.

Similar examples can be found in the other two experimental studies. Taken together, these studies provide an impressive number of guidelines for direct instruction in the early grades, the great majority of which are either overlapping or complementary (but not contradictory). Thus, in closing, I am happy to say that recent studies linking teacher behavior to student learning, and especially these experimental studies, are making significant progress in developing a scientific basis for teacher education.

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